

5-2015

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<https://doi.org/10.33015/dominican.edu/2015.PSY.ST.01>

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Recommended Citation

Grajeda, Victoria L., "The Relationship of Cell Phone Usage to Personality and Attention" (2015). *Senior Theses*. 110.
<https://doi.org/10.33015/dominican.edu/2015.PSY.ST.01>

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The Relationship of Cell Phone Usage to Personality and Attention

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Abstract

Cell phones seem to create distraction and anxiety in student's daily lives. The present study tests if distraction would occur just by the ring from a cell phone (i.e. they will score lower on the lecture quiz). The procedure will include 40 students enrolled in two sections of Introduction to Psychology. In one section, a backpack will be situated on an empty desk with a cell phone inside which is set to ring during a normal classroom lecture. Once the lecture ends (in both sections), a quiz will be issued about the PowerPoint including slides showing during the cell phone ring. A survey consisting of neuroticism and withdrawal measures (DeYoung, Quilty & Peterson, 2007) will also be issued to the classroom students as well as 70 other participants using surveymonkey.com. The survey will examine the relationships between personality and attention between those who are compulsive texters versus those who are light texters and it will also examine gender differences. It is hypothesized that 1) males text to exchange information and females text to socially connect, 2) those who are compulsive texters experience higher neuroticism and higher withdrawal versus light texters, and 3) cell phones are highly distracting in a classroom setting. Results revealed that those who use their cell phones more often tend to have higher neuroticism and withdrawal, cell phones are not distracting in a classroom setting, and males and females generally text for the same purposes.

The Relationship of Cell Phone Usage to Personality and Attention

Cell phones and texting are generally distracting and detrimental to attention (driving, school, work, etc.). Researchers have shown that cellphones affect attention (O'Connor, Whitehill, King, Kernic, Bresnahan & Ebel, 2013; Schwebel, Stavrinou, Byington, Davis, O'Neal, Jong, 2012; Thornton, Faires, Robbins, & Rollins, 2014). It is therefore important to examine all situations in which using cell phones are potentially harmful to one's social or occupational life. According to the Center for Disease Control and Prevention, more than nine people are killed and more than 1,153 people are injured in motor vehicle crashes per day (Centers for Disease Control and Prevention, 2014). Cell phones are not only detrimental to driving but also to other activities that demand attention. Previous research has suggested that students able to text in class receive lower grades than those who do not text in class (Dietz & Henrich, 2014).

According to the Pew research center, cell phone ownership has reached 91% of adults as of May 2013 (Rainie, 2013). Nomophobia is the term for cell phone addiction, and is an anxiety inducing condition that has rather damaging effects to the individual. Symptoms of nomophobia include experiencing anxiety or panic over losing your phone, obsessively checking for missed calls, e-mails, and texts, using your phone in inappropriate places, and missing out on opportunities for face-to-face interactions (Bellum, 2013). Since nomophobia has recently become more prevalent, more research has been done to show how cell phone use affects personality (Reid & Reid 2007); (Delevi & Weisskirch, 2013). In studies such as Sanchez-Martinez and Otero's (2009), cell phone usage has a significant link to depression, substance abuse, and school

failure. It important for our society to recognize the negative impacts cell phones have on personality.

Personality Scale

The Big Five Aspect Scale by DeYoung, Quilty and Peterson (2007) undertook three studies to test the validity of the 75-item Big Five Aspect Scale (BFAS). In the first study, data was collected from the Eugene-Springfield community. The study tested internal validity. Four hundred and eighty one members (200 male and 281 female) participated in taking the BFAS as well as completing the Revised Neuroticism-Extraversion-Openness Personality Inventory (NEO-PI-R) and the International Personality Item Pool (AB5C-IPIP). The NEO-PI-R breaks down each of the Big Five items into six facets while the AB5C-IPIP breaks down the items into nine facets. The Minimum Average Partial (MAP) test was used to determine correlations among variables for each test. The MAP test was able to successfully identify only factors strongly correlated across inventories. The BFAS's 75 facets were all conformed to the Big Five structure except for Trust and Assertiveness from the NEO-PI-R and Reflection from the AB5C-IPIP. The second study consisted of 480 undergraduate participants from southern Ontario (299 female and 180 men). The study calculated the highest correlations between the ten factors using the regression method. The IPIP was administered and one item was added to assess extraversion. Cronbach's Alpha was used to assess the reliability of the BFAS and was found to be .83. The third study looked at how well the two factors within the facets of each Big Five corresponded to biological factors. Jang, Livesley, Angleitner, Reimann & Vernon (2002) used 481 participants from study 1 and compared the NEO-PI-R to biological factor scores in the

Eugene-Springfield sample. Results proved that the two facets of each Big Five were highly correlated despite compassion and intellect being not correlated due to underrepresentation in the NEO-PI-R. After completing these three studies, DeYoung, Quilty and Peterson concluded that the BFAS is a reliable tool to be used in research that assesses personality components.

Cell Phone Usage and Attention

A study about cell phone use and driving was conducted by O'Connor, Whitehill, King, Kernic, Boyle, Bresnahan, Mack, and Ebel (2013). It effectively measured cell phone use and its correlation to motor vehicle crashes. Three hundred and eighty three undergraduate students were asked to complete an online survey about cell phone use and driving history. The Cell Phone Overuse Scale (a 24 item questionnaire known as CPOS) was used as a measure for compulsive cell phone use, asking questions related to frequency of behaviors representative of the habit. Using the four sub-scales (anticipation, activity interfering, emotional reaction, and problem recognition), high scores on the CPOS were associated with the female gender, elevated anxiety, and insomnia. Impulsivity was measured based on the Impulsive Behavior Scale which has 59 questions related to planning, negative urgency, sensation seeking, persistence, and positive urgency. Alcohol use was based on the 10-item questionnaire called the Alcohol Use Disorders Identification Test. Relationship style was measured according to the Relationships Style Questionnaire which includes 30 questions related to romantic and non-romantic relationships. The last measure of driving history was based on the three questions, "How many years have you been driving?" "What is the most serious type of car accident in which you have been involved while driving?" and "How many

accidents have you been involved in while driving, regardless of the severity of damage done to your care?" It is seen from this study that heightened anticipation of a phone call or text is strongly associated with car crashes. This study showed increased risk, but there is no statistical significance that these two are directly correlated.

Schwebel, Stavrinou, Byington, Davis, O'Neal, and Jong (2011) researched distraction and pedestrian safety and the impact talking on the phone, texting, and listening to music has on crossing the street. Using students from an introductory psychology course, 138 participants were asked to complete three questionnaires. The first was completely about the participant's demographic and the second a documentation of their walking habits from morning until night. The third questionnaire addressed the participant's typical use of technology during the weekdays and weekends. After thoroughly completing each survey, the participants were asked to engage in an interactive experience. They were randomly assigned to one of four conditions (music, talking on the phone, texting, or no distraction), and instructed to cross the street while partaking in their assigned task. There were five measures of safe street crossing which included average time left to spare, looks left and right before crossing, looks away from the virtual road, number of times participants were struck by a vehicle, and gaps between vehicles when participants could have crossed safely but did not. The results indicated that both texting and listening to music involve mental processes different from a telephone conversation. Texting involves reading and typing which is extremely distracting while trying to perform other tasks. Listening to music involves a disruption of auditory signals that are important in pedestrian environments.

However, the distracted groups did not miss more safe opportunities to cross the street than the undistracted group.

Another study conducted by Thornton, Faires, Robbins, and Rollins (2014a) hypothesized that the mere presence of a cell phone would have a negative impact on thought processing and task performance. A total of 54 undergraduate students with ages ranging from 18 to 46 were recruited to participate in an experiment where two manipulations occurred: a cell phone placed at the end of the table of one group and a notebook placed at the end of the table of the control group. Participants were timed in two tasks: Digit cancellation and Trait Making Test. Once the tasks were properly explained, participants were to complete them as fast as possible while the cell phone was present. The Attentional Behavior Rating Scale was used to assess attentional difficulties and the Cell Phone Usage survey collected data relating to how often participants used their cell phones. Demographics had no relation to cancellation or trail making tasks but whether or not the groups were exposed to a cell phone during their tasks had an impact on attention capacity and performance. This only proved to be true when the tasks were cognitively and attentionally demanding. The first study showed that attention can be influenced by the mere presence of a cell phone. Study two (Thornton et. al., 2014b) replicated the first study, yet the participants' own phones were used. Two groups (cell phone presence and no phone presence) consisted of 23 students (14 women and 9 men) whose ages ranged from 19 to 48. The cell phone group was told to set their phones on the desk in front of them while the second group had no mention of cell phones. The groups were asked to complete the same tasks as participants in Study One. The results of the second study concluded that more

demanding tasks caused those in the cell phone group to score lower than the control group. In both studies it is seen that manipulation of the cell phone has no affect when observed on simple tasks, but diminishes performance on complex tasks.

Lopresti- Goodman, Rivera and Dressel (2012) performed an experiment related to impact of cell phone use on walking. A group of 23 women and two men were recruited to participate in a 33 trial study where 12 formed the non-texting condition and 13 formed the texting condition. Participants in the texting group were asked to hold their cell phones at chest height for the duration of the experiment. The texting group was asked to walk through an adjustable doorway and stop at a marked white line all while typing out a given sentence ranging from 15 to 21 characters. An example of the sentences were, "I have a paper cut," or "The jar was broken." Data was collected in order to maintain appropriate distance to the white line and smallest width of the doorway that the participant would not have to adjust their body for. Results showed that participants in the texting group walked significantly slower than those in the non-texting group, and rotated their shoulders to fit through the door frame when they could have walked straight through. Even when participants are given a simple task such as walking through a door frame, there is still a level of distraction. This study showed that people who attempt to walk while texting partake in riskier behavior than those who walk distraction free.

Cell Phone Use and Personality

Sanchez-Martinez and Otero (2009) surveyed 1,328 students from Madrid on factors such as depression, social isolation, drug and alcohol use, failure in education and cell phone dependency. The subjects' ages ranged from 13 to 20. Frequency of cell

phone use was tested, and intensive cell phone use was defined by a participant using his/her phone more than four times a day or a monthly bill of \$43. Cell phone dependency was determined by the response to the questions, "Could you be without your cell phone for a day?" and, "Do you think you are nothing without your cell phone?" (Sanchez-Martinez & Otero, 2009). School failure was then defined as repetition of a grade, or had an annual mean grade of insufficient or sufficient; if sufficient the student must have failed four or more courses to be classified with school failure. Seven questions were asked to determine an adolescent's mental health score where five or more affirmative responses indicated depression. Twelve questions were asked to determine social isolation, and nine or more affirmative replies signified this trait. Next, the adolescents were asked when they had their first alcoholic drink where any response other than never signified alcohol consumption. If an affirmative response was given to the question, "Have you ever had too much to drink or been drunk?" the adolescent was affirmative for excessive alcohol consumption. Drug use was classified with responses to whether or not the participant currently smokes or has participated in any form of drug use. Results revealed that over half the students tested brought their phones to school (61% female and 47.1% male) with 83% keeping the phones on during class. Texts were sent four or more times a day by 18.2% of adolescents in this study. Those who could not spend a day without their cell phones included 18.2% of participants and 17.9% said they thought they were nothing without their cell phones. After calculating the results, the data suggested 26.1% of the females and 13% of males were cell phone dependent. Females turned out to seem the most intensive cell phone users versus males, while those in rural areas seemed more intensive than

urban areas. Age, sex, dependency, socioeconomic level, type of school, location, parents' education level, relationship between parents, relationship with family, depression, use of alcohol/tobacco, drugs, school failure, and keeping the phone on during class were all statistically significant to a child having intensive cell phone usage.

A study coordinated by Reid and Reid (2007) investigated the correlation between social anxiety, loneliness, and preferences between texting and voice communication. Reid and Reid hypothesized that those who text are differently associated with social anxiety and loneliness than those who talk on the phone. The different beliefs between texters and talkers about SMS function and purpose was also looked at and how those beliefs contribute to social anxiety and loneliness of preferred texters or talkers. Reid and Reid chose 158 individuals to complete an online questionnaire which measured social anxiety, loneliness, uses and gratifications of SMS, and preferences for texting and talking on the cell phone. Social anxiety was measured based on the Leary Social Anxiousness scale which included eleven positively and four negatively worded statements. Loneliness was measured according to the shortened version of the UCLA Loneliness Scale, assessing loneliness, shyness, and social isolation. Uses and gratifications of SMS was measured using Leung's online chat survey which touch on six primary motives for logging onto chat including expressing affection, entertainment, relaxation, fashionable appearance, socialization, and escapism. Finally, preferences for texting and talking on the cell phone were measured based on a person's response to the question "Which do you prefer: talking or texting on your cell phone?" and an estimate of the number of cell phone text messages and cell phone voice calls they sent in a typical month. The results support

all three hypotheses made for the research. On average, lonely participants preferred making voice calls and rated texting as a less intimate method of contact, while anxious participants preferred texting to either kill time or avoid another activity.

In a research article by Morrill, Jones, and Vaterlaus (2013), the objective was to understand how cell phone use is changing social relations and psychological development, specifically relationship breadth and relationship depth among young adults in the U.S (Morrill et. al, 2013). Four issues were addressed within the age group (18-24). They included the age that a person should be when receiving their first cell phone, if individuals who own cell phones are affected when their phones are absent, frequency of cell phone use, and what is being communicated through talking and texting. The focus of investigation was on both male and female college students (32.8% male and 67.2% female), 92% being Caucasian/Anglo. A questionnaire was developed with 179 questions including the Extended Measure of Ego Identity Status by Grotevant and Adams (1984) and the Erikson Psychosocial Stage Inventory by Rosenthal, Gurney, and Moore (1981). Results in this study proved that there are significant gender differences in cell phone activity. However, the age of the first cell phone for both males and females was predominantly 16. The majority of both males and females agreed that their cell phone would be most difficult to give up out of television and internet. When asked the question, "If you could not use your cell phone at all tomorrow, how much would this affect your daily routine?" almost half of both male and female respondents said "some/a lot." In general, females exhibited stronger attachment to the cell phone than males. As for the motives of texting, most females reported they use text messaging as a means to deepen their existing relationships or

to kill time while males tend to use texting to meet other people. However, aside from gender, this research touches on how technology is impairing the importance of physical closeness between humans.

Personality was tested again in accordance to cell phone usage by Delevi and Weisskirch (2013). The study measured personality traits, sensation seeking attitudes, and compulsive texting in relation to sexting behaviors of 304 undergraduate participants (126 male and 178 female). They were asked to complete a survey using Weisskirch and Delevi's measures of frequency of sexting behaviors to test the commonality of sending a sexually suggestive photo, sending a photo wearing lingerie, or sending one without clothing over the phone. It also tested sexually suggestive text messages and texts propositioning for sexual activity. Another portion of the survey included questions related to sexting and relationship to commitment. These questions allowed experimenters to examine how close a person would need to be to another in order to engage in sexting behaviors. A five question Likert scale was used for this component. Personality traits were measured using the Mini-International Personality Item Pool (Mini-IPIP). These include extraversion, agreeableness, conscientiousness, neuroticism, and intellect/imagination. Sensation seeking was tested using the Arnett Inventory of Sensation Seeking and Bianchi and Phillips's Mobile Phone Problematic Use Scale. This study showed that the majority of participants (75%) sent a sexting text message, and agreed that they would need to be dating regularly or in a committed relationship to participate in sexting behavior. When comparing personality traits, those who rated high in agreeableness and neuroticism utilized descriptive sexting behavior while those who rated low in agreeableness but high neuroticism more often used

sexually suggestive photos or videos in lingerie, underwear, or nude. Males rated high in attention seeking and problematic cell phone usage tended to most often send suggestive and propositioning texts. Eighty-nine percent of the sample engaged in some form of sexting. The study implied that men more often use sexting to attract or lure, and women more often use sexting to keep a partner interested.

Hypotheses

In the current research, therefore, differences in personality and attention were examined between those who are compulsive texters versus those who are light texters. The Big Five Aspects Scale (BFAS) is used to assess if cell phone usage has a relationship to personality. Neuroticism and Withdrawal scales from the BFAS helped identify personality aspects influenced by compulsive or light texting. It is hypothesized that 1) those who are compulsive texters experience higher Neuroticism and higher Withdrawal versus light texters; 2) males text to exchange information and women text to socially connect; and 3) cell phones are highly distracting in a classroom setting.

Method

Participants

Dominican University of California students and other participants (28 male and 93 female, age range: 18 to 89 years) were solicited through means of social media such as Facebook (see Appendix A for recruitment information) and by classroom recruitment upon permission of professor. Students participated in a recall task in a classroom setting (17 females and 8 males, age range: 18 to 35 years). Since the data collection was voluntary, participants were not compensated for their participation.

Materials and Procedure

All participants completed a survey hosted on the domain Surveymonkey.com. The survey completed included items from the Big Five Aspect Scale by DeYoung et al. 2007 (see Appendix C). There were 20 types of items related to the personality categories of Neuroticism and Withdrawal. Questions one through four related to the participant's demographics and cell phone usage while questions 21-37 related to their attitude toward cell phone usage. The survey was kept anonymous to respect participant privacy. Forty of the participants were also involved in a separate attention study also related to cell phone usage. These 25 students were enrolled in two sections of the Introduction to Psychology course and recruited with permission from their professor. During a lecture in a classroom setting, a cell phone was set to ring in a backpack. When the lecture ended, students were quizzed on information from a slide which strategically played while the cell phone went off. The quiz was a recollection task that required students to view eight words (one at a time) and recall them after they had viewed all eight. Another recollection task was given promptly after the first that did not include the distraction of the cell phone ring.

Neuroticism and Withdrawal ratings. Neuroticism and Withdrawal sub-scales were judged on a 5-point Likert scale (1= strongly disagree, 5= strongly agree). Neuroticism was a 20-item scale where twelve items were positive for high neuroticism and eight items were negative for high neuroticism. Withdrawal was a 10-item scale where six items were positive for high withdrawal and four items were negative for high withdrawal. The categories of Neuroticism and Withdrawal were selected because they are seen as negative personality characteristics.

Results

High and Low Texters

Neuroticism and withdrawal were measured using sub-scales of the Big Five Personality Aspect Scale. The higher the score in neuroticism, the more anxiety, fear, moodiness, worry, envy, frustration, jealousy, and loneliness a person experiences. The higher the withdrawal score, the more shy and removed the person is. The scores on this Likert scale could range from five to fifty. The first hypothesis was that those who are compulsive texters experience higher neuroticism and higher withdrawal versus light texters. The mean neuroticism and withdrawal ratings for each usage type are summarized in Table 1 and Table 2. A Between groups ANOVA revealed a significant difference among the mean neuroticism scores between phone usage groups, $F(2,118) = 5.4$, $MSe = 249.7$, $p < .05$. Post hoc tests using Tukey's HSD revealed subjects in the low usage group scored lower in neuroticism than high users, and subjects in the medium usage group scored lower in neuroticism than high users.

A between groups ANOVA revealed a significant difference among the mean withdrawal scores between phone usage groups, $F(2,118) = 4.6$, $MSe = 225.3$, $p < .05$. Post hoc tests using Tukey's HSD revealed subjects in the low usage group scored lower on withdrawal than subjects in the high usage group. These results are also displayed in Figure 1.

Gender

The second hypothesis was that males text to exchange information and females text to socially connect. An Independent samples t-test revealed no statistical difference in the need to feel emotionally connected between women ($N=93$, $M=2.8$, $S=1.1$) and

men ($N=28$, $M=2.5$, $S=1.3$), $t(119)=.2$, $p>.05$. Men and women are similar in using texting to feel emotionally connected. An Independent samples t-test revealed no statistical difference in the need to exchange information between women ($N=93$, $M=4.3$, $S=.8$) and men ($N=28$, $M=4.3$, $S=.67$), $t(119)=.88$, $p>.05$. Men and women are similar in using texting as a way to exchange information. These results are displayed in Table 2.

Attention

The third hypothesis was that cell phones are highly distracting in a classroom setting. An Independent samples t-test revealed that scores on the memory test without the cell phone ring ($N=27$, $M=5.8$, $S=1.4$) was statistically greater than scores on the memory test with a cell phone ring ($N=27$, $M=6.8$, $S=1.5$), $t(25)=4.1$, $p<.05$.

Performance on the memory task was better when the cell phone went off. These results are displayed in Figure 3.

Correlations

Pearson's correlation revealed there was a significant negative linear relationship between age ($M=30$, $SD=17.5$) and withdrawal scores ($M=26$, $SD=7.1$), $r(119)=-.22$, $p<.05$. Those who are older tend to be less withdrawn. Pearson's correlation revealed there was a significant negative linear relationship between age ($M=30$, $SD=17.5$) and usage amount ($M=38.3$, $SD=6.1$), $r(119)=-.25$, $p<.05$. Those who are older tend to use their phones less often. Pearson's correlation revealed there was a significant positive linear relationship between neuroticism scores ($M=25$, $SD=7.1$) and usage amount ($M=38.3$, $SD=6.1$), $r(119)=.27$, $p<.05$. Those who use their phones more often tend to have higher neuroticism ratings. Pearson's correlation revealed there was a significant

positive linear relationship between withdrawal scores ($M=26$, $SD=7.1$) and usage amount ($M=38.3$, $SD=6.1$), $r(119)=.29$, $p<.05$. Those who use their phones more often tend to have higher withdrawal ratings.

Tables and Figures

Table 1

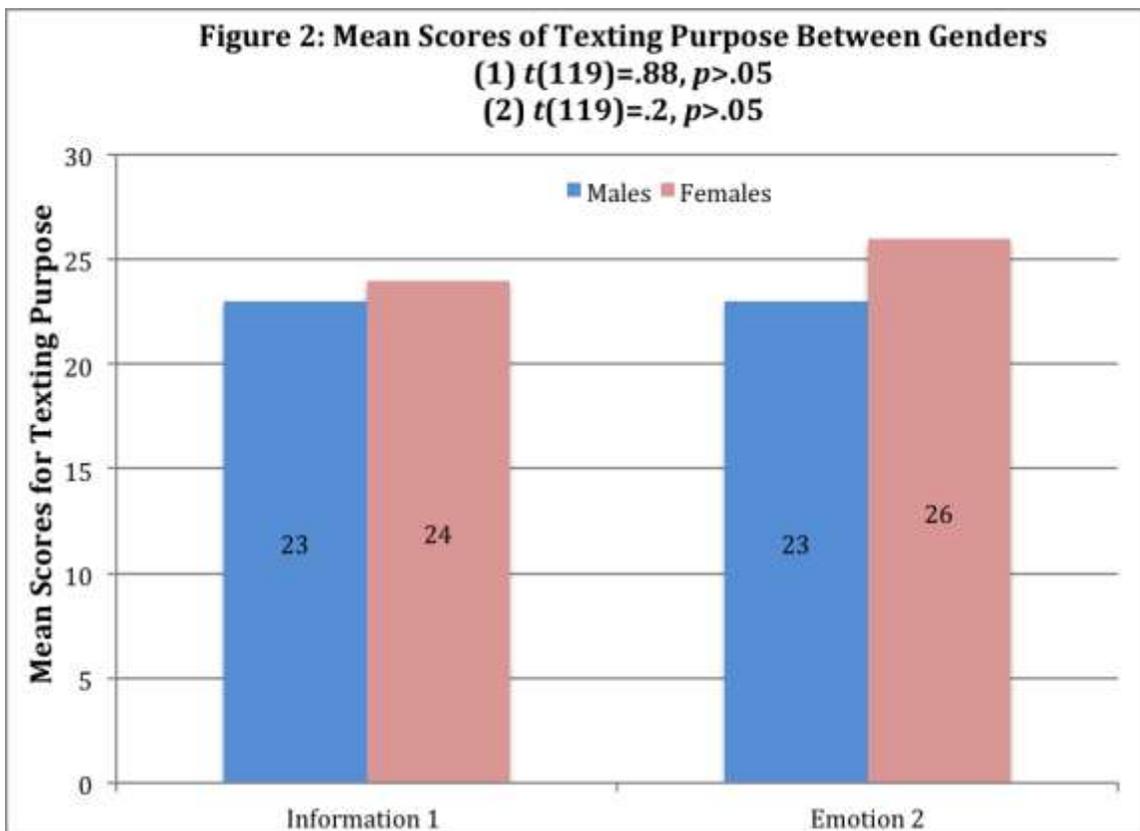
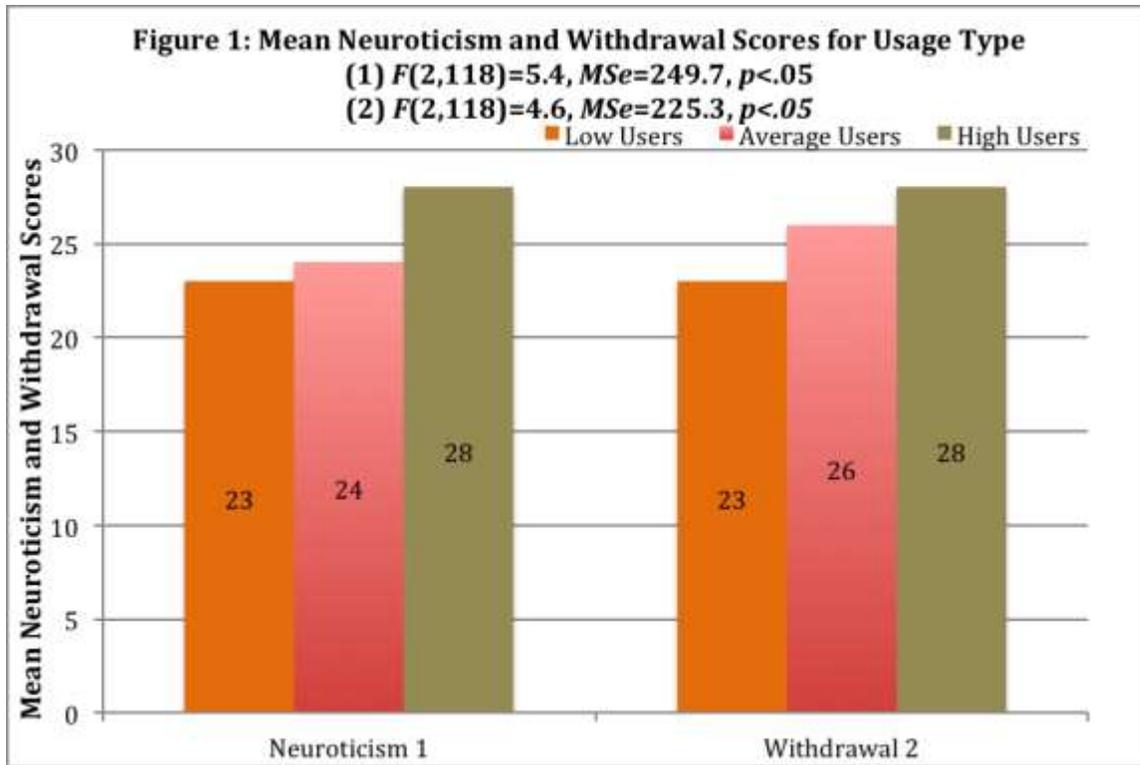
Means and Standard Deviations for Usage Type and Neuroticism

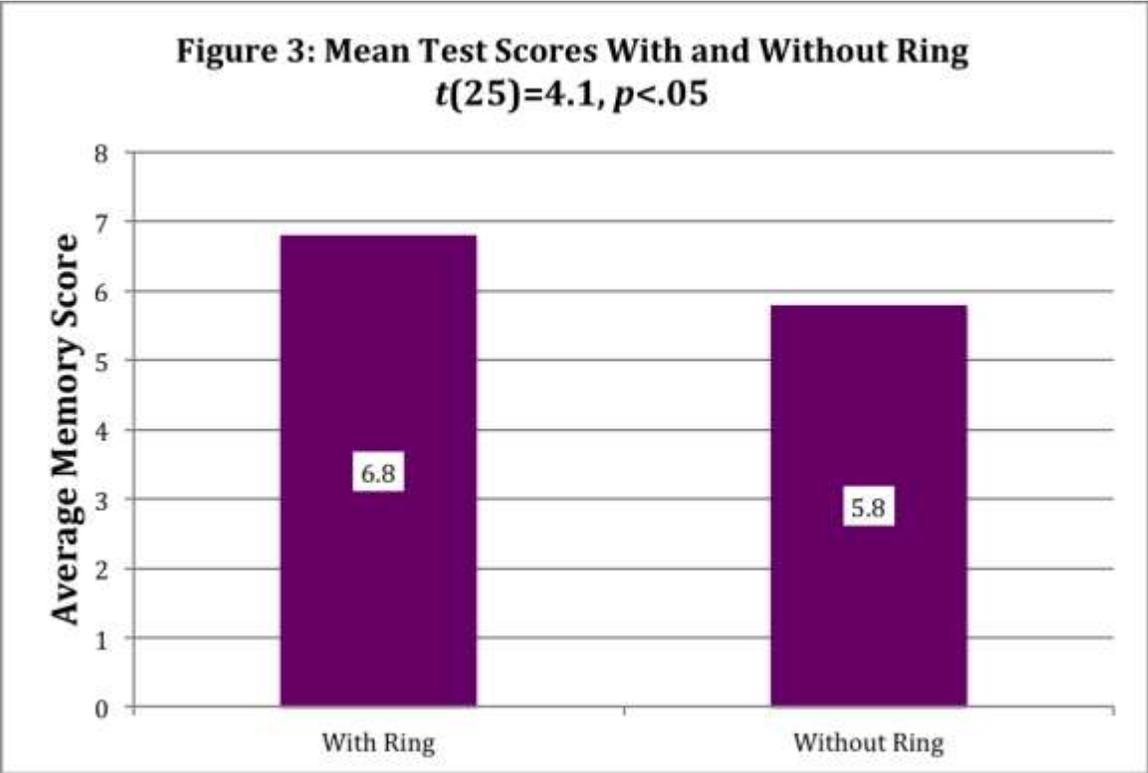
	Usage Type		
	Low	Average	High
M	23.4	23.8	27.9
SD	5.8	7.1	7.3

Table 2

Means and Standard Deviations for Usage Type and Withdrawal

	Usage Type		
	Low	Average	High
M	23.4	26.1	28.2
SD	6.9	7.7	6.2





Discussion

The first hypothesis that those who are compulsive texters experience higher neuroticism and higher withdrawal versus light texters was supported. In previous studies, neuroticism and anxiety were associated with high cell phone usage (Sanchez-Martinez & Otero, 2009; Weisskirch & Delevi, 2013). Highly neurotic and anxious people could be prone to using their cell phones more often because of pressure to maintain relationships or pressure for reciprocation of social media 'liking.' People who are already neurotic could be using their phone as avenue to feed compulsive behaviors such as checking their phone, or constantly checking in with others on media tools such as Twitter. The alternative could be that high cell phone usage creates higher neuroticism. The constant pressure of our society to be relevant and 'in the now' could cause stress on a person's life, and promote unconscious compulsive usage behaviors. Because none of the studies specifically measured withdrawal scales, we can compare withdrawal to social isolation and depression in a study conducted by Reid and Reid. Compulsive cell phone usage could be related to withdrawal because of society's current benefits of social interaction without active participation. Most social media posts are available for individuals to view privately and anonymously, therefore removing the need to exchange thoughts or ideas publicly on a regular basis.

Post-Hoc analysis revealed a difference between the neuroticism levels of low usage and high usage participants and between average usage and high usage participants. As usage levels increase, so does neuroticism scores. These could relate because the more a person is connected to social media or texting, the more stress there is to remain that way. If a person is not involved in the use of their phone as often,

there is less worry, anxiety, or fear to constantly participate. Another Post-Hoc analysis revealed a difference between the withdrawal levels of low usage and high usage participants. It could be that only these two had a relationship because very low usage requires a stronger attempt to have face-to-face interaction than if a person is fulfilling this desire by constantly using their cell phone for social media or texting. Average users would have just as much face-to-face interaction as they would have social media interaction.

The second hypothesis proposed that males would text more often to exchange information, and females would text to feel emotionally connected. This hypothesis was not supported. Past research has found clear differences in texting behavior between gender (Morrill, Jones, and Vaterlaus, 2013) in that females use texting as a way to deepen emotional relationships and males use texting to meet other people. The difference between this study and Morrill et. al, (2013) was the design of survey questions. In the current study, males and females self reported that they generally text for the same purposes. However, this ideas was assessed by stating, "I text most often to bond with others or feel emotionally connected," and "I text most often to tell people things or to receive information," on a Likert scale. This hypothesis would be better tested by looking into who individuals are texting and the content of their messages. Because of the way texting purpose was measured in this study, males and females were to rely heavily on their memory of past behavior which is unreliable. This hypothesis also may not have been supported due to participant dishonesty. Because there is the stereotype of being emotional for women, they may feel more inclined to

deviate from what society expects from them. Societal influence in this case could contribute to fluctuation of reported responses.

The third hypothesis that cell phones are distracting in a classroom setting was not supported. There was a range of restriction in this study including minimal participants and alternative environmental distractions. There were only 19 participants in the first classroom setting and six participants in the second. Having a larger sample size would have eliminated factors on the memory quiz related to chance. Also, students in the first classroom setting were distracted by obtaining a pencil, questions about the memory quiz, and personal conversations. Previous research suggests the mere presence of a cell phone has a negative impact on attention (Thornton, Faires, Robbins, & Rollins, 2014a). The difference between this study and the Thornton et. al, (2014) study was that the previous tested texting distractibility, not how a phone can be audibly distracting. Listening enables the possibility to tune out material that is not personally important, while reading a text message involves more focus. This could be why participants in the current study were able to pass the administered quiz more often than participants in the Thornton et. al, (2014) study. This study found that participant scores were higher on the memory quiz paired with the phone ring. Ability to pass the memory quiz in this study could be due to easiness of the memory words. Words on the first quiz such as car, house, drum, mom, lake, book, flag, tooth, rock, and bean could either have personal importance to the participant taking the quiz, or their one syllable make-up may not require much memory skill. The second slide contained the words cape, guard, pool, brain, take, meal, wreck, with, brake, and steal which, by chance, could have been harder to remember or did not encompass any importance. Another

potential confound to the memory quiz could be proactive interference. Because students were given the memory exercises back to back, words from the first quiz could have potentially impaired the participant's memory of the second set of words. Beside all previous speculations as to why students scored higher on the quiz with cell phone interruption, the generation of which college freshman participants belong may be better at multitasking, and therefore less prone to being distracted. Future research on this topic should recruit more participants for this portion of the study as well as an older generation. Memory quiz attempts would be more precise if a longer gap was given between each set of words. A longer set of words for each quiz would raise difficulty levels and help eliminate quiz passing based on easiness.

Other findings not related to the tested hypotheses suggest that older individuals use their cell phones less. This could be due to the generation gap, and that the older a person is, the less time they have been exposed to technology. Another finding was that females tend to have higher neuroticism scores than males. This could be due to the hormone levels in females and the way these hormones affect mood. An interesting manipulation could be done in future research to test the differences of neuroticism levels in females who are more hormonal than other females. The current study found that those who are older tend to be less withdrawn. This could be related to the older generation being more involved in the outside world because they have a smaller reliance on technology than younger generations. Without cell phones, older individuals have had to satisfy boredom by other means (by being more engaged in outside social interaction, etc.).

To improve the study, a couple modifications to the methods of this study are suggested. When evaluating differences between gender and cell phone usage, multiple scales should be used. Instead of relying on self-reporting, researchers should use a holistic approach to investigating an individual's texting history. The main focus of this study includes social media, texting, and attachment relationships in relation to cell phone use. There are many more avenues to look at in regard to cell phone usage which can contribute to personality and attention differences. Different application downloads and differences in time devoted to them could be one aspect to consider. More research is needed to uncover the detriment cell phone usage has on relationships and work ethic. Because current research effort in the cell phone usage realm has been devoted to automobile incidents, we are not fully aware of other instances where cell phones can have a negative influence. From finding higher levels of neuroticism and withdrawal in participants who are high users we learn that technology potentially has a negative influence on our lives. The current society is overrun by technology, which is why this research is ultimately beneficial in teaching us more about the affect it has.

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Appendix A
Letter of Introduction and Consent

Dear Study Participant,

My name is Victoria Grajeda and I am a senior psychology student at Dominican University of California. I am conducting a research project as part of my senior thesis requirements, and this work is being supervised by William Phillips, Professor of Psychology at Dominican University of California. I am requesting your voluntary participation in my study, which concerns cell phone relationship to personality and attention.

Participation in this study involves filling out a questionnaire. Please note that your participation is completely voluntary and you are free to withdraw your participation at any time. Likewise, your participation or non-participation will not affect your class grade. In addition, your survey responses are designed to be completely anonymous. Complete anonymity, however, cannot be guaranteed and in the unlikely event that an identity becomes known, those responses will be held in strict confidence. If you ever need further assistance, please contact the research advisor at the e-mail address provided below. Filling out the survey is likely to take approximately 15 minutes of your time.

If you choose to participate in this study, please follow the survey link and answer questions as honestly and completely as possible. Remember, this survey is completely anonymous; do not put your name or any other identifying information on your survey form.

If you have any questions about the research you may contact me at the e-mail address below. If you have any further questions you may contact my research supervisor, William Phillips at william.phillips@dominican.edu, (415) 482-3596 or the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS), which is concerned with protection of volunteers in research projects. You may research the IRBPHS Office by calling (415) 482-3547 and leaving a voicemail message, by FAX at (415) 257-0165, or by writing to IRBPHS, Office of Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 95901.

If you would like to know the results of this study once it has been completed, please contact me at the e-mail address below.

Thank you in advance for your participation.

Sincerely,

Victoria Grajeda

Psychology Student

Dominican University of California

San Rafael, CA

E-mail: victoria.grajeda@students.dominican.edu

Appendix C Survey

Age:

- a) Under 18
- b) 18-25
- c) 25+

Gender:

- a) male
- b) female

Grade Level:

- a) High School
- b) College
- c) Graduate

If in college, which level?

- a) Freshman
- b) Sophomore
- c) Junior
- d) Senior

Type of phone:

- a) Smart Phone
- b) PDA
- c) Slider Phone
- d) Flip Phone
- e) Budget Cell Phone

ANSWER THE FOLLOWING QUESTIONS ON A SCALE OF 1 TO 5. (1= STRONGLY DISAGREE, 5= STRONGLY AGREE.)

- | | | | | | |
|-------------------------------------|---|---|---|---|---|
| 1. I get angry easily | 1 | 2 | 3 | 4 | 5 |
| 2. I rarely get irritated | 1 | 2 | 3 | 4 | 5 |
| 3. I get upset easily | 1 | 2 | 3 | 4 | 5 |
| 4. I keep my emotions under control | 1 | 2 | 3 | 4 | 5 |
| 5. I change my mood a lot | 1 | 2 | 3 | 4 | 5 |
| 6. I rarely lose my composure | 1 | 2 | 3 | 4 | 5 |

7. I am a person whose moods go up and down easily
1 2 3 4 5
8. I am not easily annoyed
1 2 3 4 5
9. I get easily agitated
1 2 3 4 5
10. I can be stirred up easily
1 2 3 4 5
11. I seldom feel blue
1 2 3 4 5
12. I am filled with doubts about things
1 2 3 4 5
13. I feel comfortable with myself
1 2 3 4 5
14. I feel threatened easily
1 2 3 4 5
15. I rarely feel depressed
1 2 3 4 5
16. I worry about things
1 2 3 4 5
17. I am easily discouraged
1 2 3 4 5
18. I am not easily embarrassed
1 2 3 4 5
19. I become overwhelmed by events
1 2 3 4 5
20. I am afraid of many things
1 2 3 4 5
21. It would really upset me if I recieved zero "likes" on my social media status
1 2 3 4 5
22. I post on social media once a day or more
1 2 3 4 5
23. I often converse with my partner and friends over the phone
1 2 3 4 5
24. I often use my phone for business purposes
1 2 3 4 5
25. I keep my phone in my bag or pocket when at school or work
1 2 3 4 5
26. I would feel very anxious if I left my phone at home
1 2 3 4 5
27. Most of the time I use the social media applications on my phone
1 2 3 4 5
28. I have over 20 applications downloaded on my phone
1 2 3 4 5

29. Right now I am currently participating in three or more text message conversations

1 2 3 4 5

30. I do not like calling people to talk as much as I like texting

1 2 3 4 5

31. Daily I take photos of myself and post one or more on social media

1 2 3 4 5

32. I can sit comfortably on the couch and watch TV without being on my phone

1 2 3 4 5

33. While having conversations with others I tend to check my phone periodically

1 2 3 4 5

34. While having conversations with others I respond to incoming texts

1 2 3 4 5

35. I believe that you should not have your phone out at the dinner table

1 2 3 4 5

36. I text most often to bond with others or feel emotionally connected

1 2 3 4 5

37. I text most often to tell people things or to receive information

1 2 3 4 5

Appendix D
Thank You Page

Dear Participant,

Thank you for participating in this research project.

If you would like to know the results of this study once it has been completed in May 2015, please contact me at the e-mail address below.

If you have any questions or concerns about the research you may contact me at the e-mail address provided below, or you may contact my research supervisor, William Phillips at william.phillips@dominican.edu.

Thank you again for your participation.

Sincerely,

Victoria Grajeda
Psychology Student
Dominican University of California

Email: victoria.grajeda@students.dominican.edu